
4.0 ENVIRONMENTAL IMPACTS

4.1 INTRODUCTION

This chapter analyzes the potential environmental impacts of seismic exploration in the proposed project for each resource issue brought forth from Chapter 3.0. An environmental impact is defined as a modification in the existing environment brought about by development activities. Impacts can be beneficial or adverse, can be a primary result of an action (direct impacts) or a secondary result (indirect impacts), and can be permanent or long lasting (long-term impacts) or temporary and of short duration (short-term impacts).

Short-term impacts occur during and immediately after project-related activities occur. Although short-term in duration, such impacts may be obvious and disruptive. Unless specifically described, short-term impacts are defined as those lasting 5 years or less, whereas long-term impacts last more than 5 years.

Impacts are quantified whenever possible; however, this is often impossible for a variety of reasons. When quantification is not possible, impact assessment is classified at one of five levels: significant, moderate, low, negligible, and no impact. Significant impacts (as defined in CEQ guidelines 40 CFR 1500-1508) are effects that are most substantial and therefore should receive the greatest attention in decision-making. Moderate impacts do not meet the criteria to be classified as significant but nevertheless result in change that is easy to detect. Low impacts are discernable but have limited affects on the resource. Negligible impacts result in barely discernable effects to the existing environment and cannot be easily detected. Impact levels are based on regulatory standards, scientific and environmental documentation, and professional judgement. Impacts are considered adverse unless identified as beneficial.

Discussions of potential environmental consequences for each alternative include the following subsections:

- Impacts by Alternative. This section discloses the level and duration of impacts that would occur as a result of the various Alternatives. Each resource is discussed separately by issue. This impact evaluation assumes that applicant-committed practices described in Chapter 2.0 would be implemented to avoid or minimize impacts.
 - Mitigation. This section describes any additional mitigation measures that could be applied to avoid or further reduce impacts.
 - Residual Impacts. This section reveals the impacts on the affected environment that would remain after the application of mitigation measures.
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- Monitoring/Compliance. This section identifies what resources should be monitored and why, who would do the monitoring, and the frequency and duration of the monitoring.

Cumulative impacts are impacts that result from the incremental impacts of an action added to other past, present, and reasonably foreseeable action scenarios, regardless of who is responsible for such actions. These impacts are presented in a separate section that includes three parts--past and present actions, reasonably foreseeable action scenarios (RFAS), and cumulative impacts. Past and present actions and RFAS identify the actions that would cumulatively affect the same resources as the alternatives being analyzed.

Chapter 4.0 analyzes the impacts of Alternative A (Proposed Action) and Alternative B (No Action Alternative) on four critical elements of the human environment: cultural resources; Native American religious concerns; floodplains; and TEPC species. In addition, impacts to six other resources are analyzed: vegetation; wildlife resources; soils; recreation; paleontology; and lands having wilderness characteristics.

Following are the assumptions used to evaluate environmental impacts.

- The proposed project would be conducted as described in Chapter 2 of this document.
- The applicant-committed environmental protection measures presented in Appendix B would be implemented.
- The proposed project would begin vibroseis activities and shot hole drilling about September 1, 2004, so as to avoid seasonal closures for raptor nesting. However, impact analysis is also included should the project be activated during times of the year when seasonal restrictions are in effect.

4.2 DIRECT/INDIRECT IMPACTS

4.2.1 Alternative A – The Proposed Action

4.2.1.1 Cultural Resources

Issue 1. Direct impacts to cultural sites.

A Class III cultural resources survey has located all sites that could be affected by project-related activities, and those sites would be avoided. If the seismic lines were subsequently used for ORV use,

opportunities for vandalism may increase to an unknown level, depending on volume of traffic. However, a final compliance inspection report (BLM 2003l) for the Horse Point seismic project completed in the fall of 2002, states that “To date, access routes have not encouraged other ORV use, and in areas of dense brush, the amount of debris and remaining vegetation will probably discourage future travel.” Several final compliance inspection reports for exploration conducted in or adjacent to the proposed project area under the Veritas EA reported that seismic lines were not evident and would be unlikely to encourage ORV use in the future (BLM 2003b, g, h, i, j, k). The final monitoring/compliance report for the project analyzed in the Horse Point EA (BLM 2003l) reported that “There were no cultural resources known to be impacted” and compliance reports for the Veritas EA (BLM 2003a-k) reported no adverse impacts to cultural resources. Because cultural resources would be avoided, no impacts would occur. In addition, the Class III cultural resources survey adds to the knowledge of the history of the area.

4.2.1.2 Native American Religious Concerns

Issue 1. Impacts to Native American religious concerns.

One Tribe responded to Native American consultation requests by BLM. No traditional cultural properties were identified. The Hopi did object to any ground-disturbing activities on BLM land with the potential to disturb the human remains and associated funerary objects of its ancestors. This comment was not specific to the project area, and is further addressed in Section 5.3.8 of this EA.

4.2.1.3 Threatened, Endangered, Proposed, and Candidate (TEPC) and Special Status (SS) Species

Bald eagle. No bald eagle nests occur within the proposed project area; however, one bald eagle nest is present along the White River in Colorado east of the area but it has not been active the last few years. Bald eagles would likely be present along the White River to the south and west of the project area during the winter, and wintering bald eagles and migrants would likely forage in the area. Drilling and recording activities could result in disruption of foraging activities. However, such disruption would be local and temporary, and alternative foraging habitat is available. The proposed project may affect, but is not likely to adversely affect, bald eagle.

Mexican spotted owl. Although the 1997 Mexican spotted owl habitat model identified numerous areas of potential nesting habitat for the species--primarily in the White River Canyon along the southern edge

of the proposed project area--the 2000 Mexican spotted habitat model did not identify any suitable nesting habitat in or adjacent to the proposed project area. No verified sightings of Mexican spotted owls have been recorded in the Book Cliffs Resource Management Area, and no critical habitat or protected activity centers have been identified. If the proposed project occurred as planned, it would be outside the breeding season for Mexican spotted owl. Owls could be temporarily disturbed or displaced, and the project may affect, but would not be likely to adversely affect, the species.

If the proposed project occurred during the Mexican spotted owl mating/nesting season, drilling, shooting and recording activities could disrupt breeding activities, resulting in nest abandonment and/or loss of chicks. Loss of an individual could result in the loss of local population viability due to the low number of individuals in northeastern Utah. However, this would be completely mitigated by avoidance of potential breeding habitat identified within 0.5 mi of project-related activities from March 1 - August 31 (see Section 2.2.6.6). Therefore, the proposed project may affect, but would not be likely to adversely affect, Mexican spotted owl.

Sensitive Animal Species. Bluehead sucker and flannelmouth sucker are not found within the proposed project area, but do occur in the White and Green Rivers to the south and west. They could be affected, increased turbidity or sedimentation, or other degradation of water quality. However, no increases in turbidity, sediment load, or other impacts to water quality would occur (see Section 4.2.1.6); therefore, neither species would be affected by the proposed project.

The cornsnake is unlikely to be adversely affected by the proposed project because it is most often found in habitats associated with riparian areas and is secretive, nocturnal, and spends much of its time in rodent burrows.

There are no greater sage-grouse leks in the proposed project area; however, greater sage-grouse do inhabit the area and are likely to nest there. The proposed project is planned to begin after September 1, by which time all greater sage-grouse nesting has ended. Individual birds could be temporarily disturbed/displaced, but such impacts would be negligible. If drilling or recording occurred during the greater sage-grouse nesting season, impacts to nesting birds would be completely mitigated by avoiding such activities in suitable nesting habitat within 2 mi of an active greater sage-grouse lek (see Section 2.2.6.6).

Mountain plover occur in the proposed project area, although sightings have been recorded primarily in the fall after the nesting season. The proposed project is proposed to begin after September 1, by which time all mountain plover nesting has ended. Individual birds that have not yet left the area on their fall migration could be temporarily disturbed/displaced, but such impacts would be negligible. If drilling or recording occurred during the mountain plover nesting season, impacts to nesting birds could be completely mitigated by avoiding such activities in active breeding/nesting areas using BLM survey methods.

Virginia warbler, black-throated gray warbler, gray vireo, and Brewer's sparrow are all migrants that would be through nesting and perhaps already gone from the proposed project area by the September 1 start of project-related activities. They would not be affected by the proposed project. If the project was initiated during the breeding season for these species, project-related activities could temporarily displace birds or interfere with reproductive success. This could be completely mitigated if surveys were conducted to locate nesting birds and these nests were avoided.

Like the previously mentioned SS bird species, the sage sparrow and pinyon jay would have completed nesting prior to September 1. Some individuals could be disturbed and displaced, but this would have negligible impacts because of suitable habitat on adjacent undisturbed areas on the species and the temporary nature of the disturbance in any give area. If the project was initiated during the breeding season for these species, project-related activities could temporarily displace birds or interfere with reproductive success. This could be completely mitigated if surveys were conducted to locate nesting birds and these nests were avoided.

Prairie falcon, ferruginous hawk, and burrowing owl would have completed nesting prior to September 1. Some individuals could be disturbed and displaced, but this would have negligible impacts because of suitable habitat on adjacent undisturbed areas and the temporary nature of the disturbance in any give area. If the project were initiated during the breeding season for these species, project-related activities could temporarily displace birds or interfere with reproductive success. However, this would be completely mitigated by conducting surveys to identify active nests and avoiding these nests by 0.5 mi as described in Section 2.2.6.7 and Table 2.2.

Big free-tailed bats have not been collected in Uintah County (Oliver 2000) and are relatively rare in Utah. The species inhabits rugged, rocky terrain and is a seasonal migrant throughout most of its range.

They require the presence of an extensive vertical drop to achieve flight, and this reduces roost sight availability greatly. They typically roost in rock crevices, but will also occasionally roost in caves, building, and tree holes. Because the species has not been collected in Uintah County, and because of its roost requirements, it is unlikely that the species would be affected by the proposed project.

The threat to Townsend's big-eared bat is primarily the loss of roost habitat, which occurs primarily in abandoned mines and natural caverns. Neither such habitat would be disturbed by project-related activities, and impacts to the species would be non-existent to negligible

4.2.1.4 Floodplains

Issue 1. Impacts to floodplain functions.

No construction or permanent structures would occur in floodplains; therefore, the project would comply with Executive Order 11988, *Floodplains Management*. Disturbance would be temporary as a result of vehicles traversing seismic lines. BLM final compliance inspection reports for work done under the Veritas EA (BLM 2003c,h) indicated that evidence of crossings in two wash bottoms were visible but would soon be obliterated by water, or, in the second instance, had already been washed out by fall storms.

Issue 2. Impacts to banks of Coyote Wash.

High, steep banks along Coyote Wash would be avoided by vehicular traffic. These areas would be avoided if they occurred along seismic lines, and an area with a lesser grade would be used for crossing the wash.

4.2.1.5 Paleontological Resources

Issue 1. Disturbance/destruction of significant paleontological materials.

No impacts to paleontological resources are anticipated because all known paleontological localities would be avoided. Surveys have been conducted to identify fossils in other areas that previously have not been surveyed and where important fossils could likely occur, and any new localities would be avoided.

As deemed necessary by BLM, a BLM representative would accompany vibroseis buggies and buggy-mounted drills during operations in areas having high value for paleontological resources to ensure that no such resources would be damaged.

4.2.1.6 Soils

Issue 1. Increased wind and water erosion.

Estimated project-related surface disturbance would total 493 acres, 1.0% of the proposed project area. Compaction of the soil could result in decreased infiltration and a corresponding increased soil surface runoff with increased erosion and sediment production. In addition, vehicle traffic along each line could leave tire track imprints, with the degree of depth of the imprints dependent upon the density of vegetation, the soil type, the amount of surface rock, and the presence of snow. Vehicle tracks on slopes between 20 and 40% could lead to the formation of rills and new flow patterns during precipitation events following the disturbance. Where the vehicles cross ephemeral drainages, and tracks cut across channel banks, channel banks would be susceptible to increased erosion and lateral headcutting, depending upon the slope of each channel bank and the degree of vegetative armoring present. The severity of impacts to soils would be reduced by having vibroseis buggies travel in a "V" formation so that, in most cases, only one pass would be made over a given area of soil.

A BLM compliance review (BLM 2001c) of a recent 2-D seismic project reported that buggy-mounted drills, ATVs, and heli-portable methods caused little soil disturbance, and concluded that soils would be normal in appearance after the next spring's rains (Figures 4.1 and 4.2). In areas of heli-portable drilling it was difficult to locate where work had been performed (approximately 1 week after drilling), and then only at extremely close range. All that was noticeable were footprints by workers and small areas (less than 3 ft in diameter) of subsurface soil cuttings where drilling occurred. The final compliance inspection reports for work done under the Veritas EA (BLM 2003a-2003k) report that impacts to soils were overwhelmingly minimal/negligible, and that no reclamation or seeding was required on any of the lines.

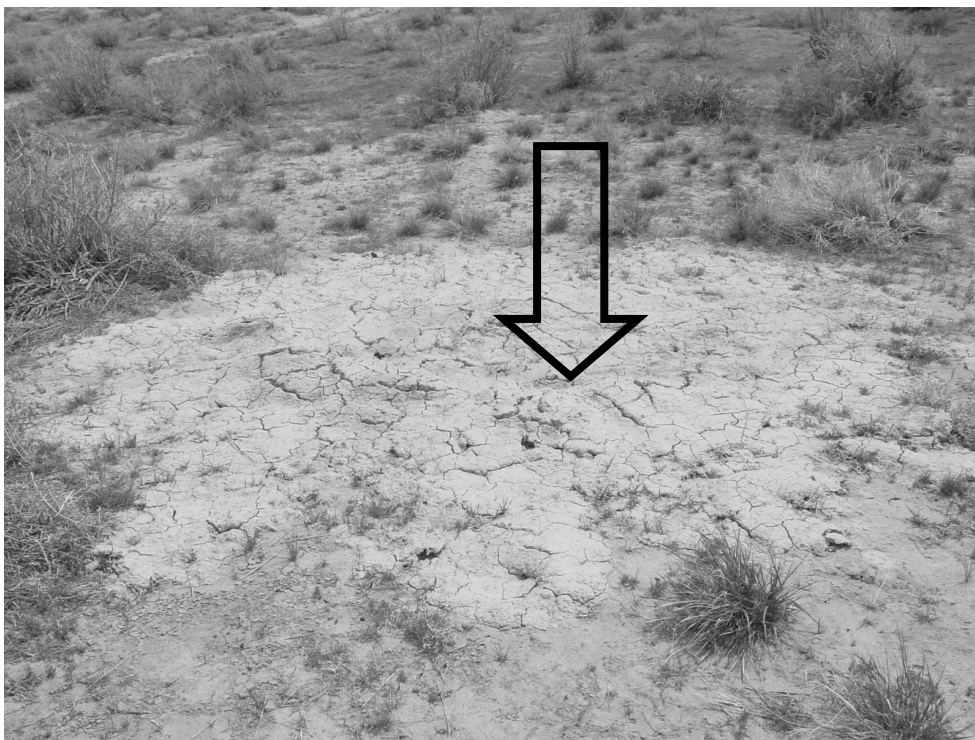


Figure 4.1 Buggy-drilled Shot Hole. Arrow Points to Hole Where Wires Protrude. The Rest of the Disturbance is Drill Cuttings Only.



Figure 4.2 The Light Gray Cuttings and the Tire Tracks of a Buggy-mounted Drill.

The final compliance inspection report for work done under the Horse Point EA (BLM 20031) reports that there were no significant impacts to soils, that anticipated impacts identified in the Horse Point EA were overestimated, and that no significant erosion had occurred. Soil compaction appeared to be a non-issue. For the heli-portable drilling, surface disturbing actions would be limited to the drill hole itself (4-5 inch diameter) and the resulting impacts to soils are expected to be negligible (Figure 4.3).

Issue 2. Lack of reclamation success.

Based on past reclamation success, which has been moderately successful, reclamation associated with the proposed project should also be successful. Most of the past reclamation in the proposed project area has been associated with road and well pad construction, which is a more severe impact on soils than seismic exploration. As previously mentioned, final compliance inspection reports for work done

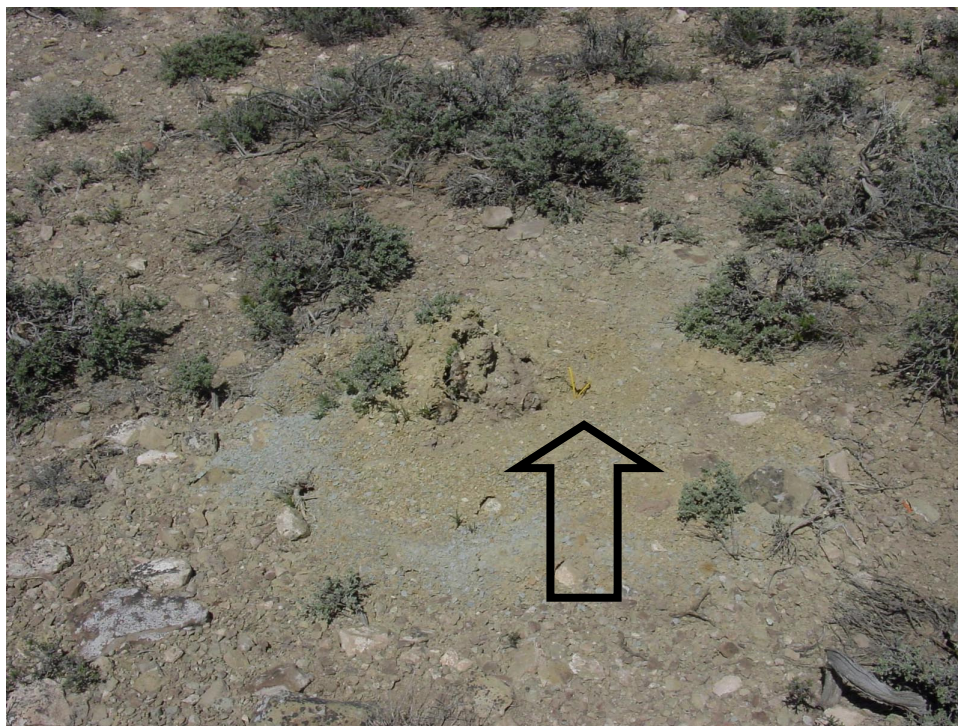


Figure 4.3 A Heliportable Drilled Hole. Light Yellow Cuttings in a Compact Circle Are Visible on Top of Gray Cuttings. Arrow Points to Yellow Wires Protruding from Hole That Will Be Used to Detonate Explosives and Thereafter Removed.

under the Veritas EA (BLM 2003a through 2003k) report that impacts to soils were overwhelmingly minimal/negligible, and that no reclamation or seeding was required on any of the lines. Some reclamation was required on two helicopter landing zones. The final compliance inspection report for work done under the Horse Point EA (BLM 2003l) reports that no reclamation or seeding was required on any of the lines.

Issue 3. Impacts to biological soil crusts.

Biological soil crusts are vulnerable to surface disturbing activities including vehicle traffic (both recreational and commercial), livestock grazing, and even foot traffic. The impact of a given disturbance depends upon its severity, frequency, timing, and type, as well as the climatic conditions during and after the disturbance (BLM 2001b). Vehicular traffic can rapidly destroy biological soil crusts (Johansen and Rushforth 1985; Belnap 1994; BLM 2001b). The weight of the vehicles and their tire action could crush the crusts and break them apart, overturn them, and bury them to various degrees, and the impacts would increase with increased vehicular traffic. This could result in increased wind and water erosion and reduced nitrogen fixation on the disturbed areas until the biological soil crusts recovered.

Recovery rates for biological soil crusts are dependent on numerous factors including the type, extent, and severity of the disturbance; vascular plant community structure; adjoining substrate condition; availability of inoculation material; and weather conditions during and after disturbance (Belnap et al. 2001). Cyanobacteria-dominated crusts--the most common type in the project area--are more resistant to mechanical disturbance, are highly mobile, and can recolonize disturbed surfaces relatively quickly. Examination of studies estimating recovery times for biological soil crusts vary considerably. On the Colorado Plateau, scalped plots (where the biological soil crust was completely removed) were reassessed 2 to 5 and 10 to 14 years after disturbance. After 2 to 5 years, cyanobacterial cover was predicted to recover in 45 to 110 years, whereas it recovered within 14 to 34 years. At one site, early estimates for recovery were 400 years, whereas later estimates were 42 years. In contrast, the recovery time for *Collema* (a lichen) after 3 years was estimated at 85 years, and after 14 years was estimated at 50 years. Cole (1990) reported that soil crusts pulverized by hikers in Grand Canyon National Park recovered substantially in the first year after trampling ceased, and after five years cryptogam cover had returned to pre-trampling levels and all visual evidence of damage was gone, although complete recovery had not occurred and would take longer than 5 years. Belnap (personal communication, July 27, 2001, with Jayne Belnap, Canyonlands Field Station, Forest and Rangeland Ecosystem Science Center, U.S. Geological

Survey, Moab, Utah to Maggie Wyatt, Field Manager, and Bill Stringer, Assistant Field Manager, BLM, Moab, Utah) stated that “Work around the western US and other continents show that the soil flora, soil surface integrity, and nitrogen inputs is dependent upon precipitation levels. For southern Idaho north, recovery is on the order of 20-50 years. For the Moab area, it is 250-300 years if material is removed. If crushed in place (meaning a one-time pass with a vehicle), it is considerably less, but all data indicates it is still on the order of 50-100 years.” These and other estimates of recovery time indicate that such estimates are difficult to make and depend on numerous factors, some of which are difficult to assess.

The proposed project would disturb approximately 1.0% (5 acres) of the estimated 500 acres of biological soil crusts in the project area, or 0.008% of the proposed project area (Figure 4.4). The severity of the disturbance to crusts from the proposed project would likely be moderate (crusts are crushed, broken apart, and somewhat displaced [less than 50% overturned and buried]) to severe (crusts are crushed, broken apart, and greatly displaced [more than 50% overturned and buried]) in areas where vibroseis buggies or buggy-mounted drills are used, and slight (crusts are only crushed) in areas of heli-portable drilling. Crusts crushed/buried in place from vehicle and foot traffic are expected to recover much faster



Figure 4.4 Seismic Line (Created by Truck-Mounted Drill) Ran from Where Photographer Is Standing to Horizon. Impacts Were Negligible, Even in the Cryptobiotic Soils.

(Belnap 1994; BLM 2001b) because adjacent crusts are available to inoculant disturbed areas, thus facilitating recovery. In addition, when biological soil crusts are disturbed, Dawson would rake biological soil crusts into the tracks from the sides when the tracks are hand-raked out, as determined by the BLM (see Section 2.2.6.5). The final compliance inspection report for work done under the Horse Point EA (BLM 2003l) reports, "A few Cryptobiotic patches were traversed by drilling rigs, but even when directly run over, the plants were alive and appeared to be essentially unaffected in May 2003." Comments on impacts to soil crusts were mentioned only once in the area covered by the Veritas EA. Impacts to cryptobiotic soils from Line 13 were described as follows: "Impact was negligible, even in the cryptobiotic soils." (BLM 2003i).

4.2.1.7 Vegetation

Issue 1. Direct impacts to native vegetation.

Estimated project-related surface disturbance would total 493 acres, or 1.0% of the proposed project area. For the shrub species, the proposed action could result in the crushing of plants and breaking off of limbs and branches. For the smaller shrubs, (shadscale, winterfat, sagebrush, etc.) crushing of these plants could lead to some plant mortality. Several years of drought have resulted in dramatically reduced vegetative and seed production for Wyoming sagebrush, resulting in sagebrush being in a severely stressed state of condition. The imposition of the additional stress of crushing and breaking of limbs and branches from vehicle activity could increase the probability of mortality for Wyoming sagebrush. For the other shrubs, the crushing and breaking of limbs could result in a decline in vegetative vigor and growth in the short term. It would likely take up to 5 years for the other shrub species to recover from the crushing and breaking of limbs, and possibly longer if existing drought conditions continue through the next several growing seasons. The severity of impacts to vegetation would be reduced by having vibroseis buggies travel in a "V" formation so that, in most cases, only one pass would be made over a given area of vegetation.

The final compliance inspection report for work done under the Horse Point EA (BLM 2003l) reports, "The most obvious, but short term and insignificant, impact of the project was the crushed brush...which will be a short term adverse impact on visual resources for some individuals" and "Physical access to buggy drilled holes caused the crushing of brush and the associated visual impact. This was most visible in areas of sagebrush and mountain browse species over 2' high." Comments on impacts to vegetation in

the area covered by the Veritas EA repeatedly commented on “crushed sagebrush”. Most sagebrush was not killed, and overall, disturbance was negligible, would not be noticed by casual observers or passers-by, and would not encourage ORV use in the future (Figure 4.5).

Dawson would power wash all equipment prior to entering the project area to remove soils and mud from the equipment to reduce the potential for introduction of invasive weeds from outside the proposed project area (see Section 2.2.6.3).

4.2.1.8 Wildlife Resources

Issue 1. Impacts to pronghorn, prairie dogs, raptors, and migratory birds.

Potential impacts to wildlife include the direct loss of habitat due to removal of vegetation; displacement of wildlife due to disturbance by project-related activities and increased public access; stress and increased energy costs, especially during the winter, caused by disturbance of animals during critical



Figure 4.5 Seismic Track (by Buggy) Through Sagebrush. Sagebrush Branches Broken by Tires But Tall and Healthy Between Tracks.

seasons; increased mortality due to poaching and harassment; an increased likelihood of animal/vehicle collisions due to increased traffic; and habitat fragmentation. The Proposed Action would directly disturb approximately 493 acres of native habitats due to activities associated with surveying, drilling, shooting, and recording along seismic lines. As discussed in Section 4.2.1.7, disturbance to vegetation would be negligible; therefore, impacts to habitat and food sources would also be negligible. For this same reason, impacts to habitat fragmentation are unlikely. Dawson would not allow firearms to be carried by employees and contractors and would not allow harassing or shooting of wildlife or unnecessary off-road driving (see Section 2.2.6.1). This would negate any project-related poaching or harassment of wildlife.

Some unquantifiable amount of displacement of pronghorns from areas adjacent to project-related human disturbance, such as drilling and recording, would reduce pronghorn use of habitat during the time the disturbance continued. Displacement likely would be about 0.5 mi (Gusey 1986; Guenzel 1987; Easterly et al. 1991). Once the disturbance ended, however, pronghorn likely would again utilize the habitat. Although methodologies for documenting animal displacement or changes in distribution are fairly straightforward, those for documenting population-level impacts (i.e., survival, reproduction) are extremely complex. Thus, little information is available concerning how human-related disturbances impact reproduction and survival of ungulates (Western EcoSystems Technology Inc. [West] 2003). Reeve (1984) found that pronghorn habituated to increased traffic volumes and heavy machinery as long as traffic moved in a predictable manner. Reaction of pronghorns to roads is not well understood; however, drivers often see pronghorns adjacent to road rights-of-way, including even busy interstate highways, in pronghorn habitat. Based on these studies, it is likely that the proposed project would result in some temporary displacement on pronghorns; however, such displacement would be short term and would not affect pronghorn populations. However, if disturbance occurred during the fawning season it could increase stress levels in does and/or fawns and result in mortality, especially considering that the animals are already stressed due to the drought.

Drilling, shooting, and recording could disrupt raptor breeding activities resulting in nest abandonment or loss of chicks if it occurred during the mating/nesting season (see Table 2.2). However, seismic exploration is not planned to occur during the nesting season of any raptor species. Therefore, impacts to raptors would be limited to temporary disturbance/displacement of adult birds that would result in negligible impacts. If the project would be conducted during the mating/nesting season, applicant-committed practices to avoid active nests (see Section 2.2.6.7) would limit impacts to negligible levels as well.

Menkins and Anderson (1985) reported the following based on their 1983-1985 study designed to examine the response of white-tailed prairie dog populations to seismic activity:

Our objective was to determine whether or not vibroseis impacted these populations, and did so by testing the null hypothesis of no effect on: 1) physical living space, 2) vegetation structure, and 3) population dynamics. Our results indicate that vibroseis did not have any impact on any aspect of prairie dog ecology or population dynamics that we examined. We conclude that the white-tailed prairie dog population studies was not adversely affected by vibroseis.

Young and Sawyer (1981) reported that they did not see any structural damage to active prairie dog burrows as a result of vibroseis. Based on these studies, as well as the temporary nature of project-related disturbance at any one location, impacts to prairie dogs would be negligible.

Impacts to migratory birds would be dependent upon the timing of seismic activity. If the project would begin late summer/early fall as planned, nesting and rearing would be complete and many of the migratory birds would have left the proposed project area. Disturbance to any remaining birds would be localized and temporary, and project-related impacts would not have a measurable effect on individual species or on migratory bird populations as a whole.

If the proposed project would be implemented during the mating/nesting season (late May through July), project-related activities could result in some nest abandonment, direct mortality, reproductive failure, displacement of birds, and desertion/destruction of nests. Ground nesting birds would be particularly susceptible to nest destruction. Shrub nesting birds would also be affected due to disturbance of some vegetation along seismic lines. Approximately 1.0% of the proposed project area would be directly disturbed by vehicular use, and nest destruction would be limited to this area. However, disturbance resulting in temporary displacement would occur in a larger area and would be species-specific, short-term, and temporary, but could result in increased nest abandonment. These impacts could be completely mitigated by surveying seismic lines for nests and avoiding those nests.

If seismic lines are subsequently used as ORV trails there would be increased human disturbance and negative impacts on migratory birds. These effects would include nest destruction, nest abandonment, mortality of young, reproductive failure, and loss of forage and cover. The severity of these impacts is unknown and would depend upon the traffic volume. However, the final monitoring/compliance report for the Horse Point seismic project (BLM 2003I), analyzed in the Horse Point EA, reported "The most obvious, but short term and insignificant, impact of the project was the crushed brush, light colored drill

cuttings on the surface and drilling buggy tracks on roads and borrow ditches, which will be a short term adverse impact on visual resources for some individuals. The buggy tracks have already largely disappeared” and “No significant impact to wildlife was noted ... Deer were common along the main travel route on Seep Ridge and remained in the area from Buck Canyon to Indian Ridge turnoffs during and after the project. Individual markings such as antlers and ear notches indicated many animals remained along the roads in spite of 20 or more vehicles traveling the road during most of the project...The other mountain browse species which were crushed, are largely decadent, and should sprout in the spring, creating more desirable forage.” (It should be noted that Horse Point is located at a higher elevation in the Book Cliffs in an area that is more heavily vegetated than the proposed project area.) During activities covered by the Moon Ridge EA, evidence that bear, deer, and elk remained in an area of active drilling was observed (Figure 4.6). The final compliance inspection reports for the area covered by the Veritas EA made no mention of disturbance to wildlife, and did say that disturbance along seismic lines would not be likely to encourage ORV use in the future.

4.2.1.9 Recreation

Issue 1. Reductions in recreation opportunity and experience.

It is unlikely that the proposed project would have other than low impacts on recreational use in the proposed project area because of the temporary disturbance at any one location and the relatively short-term period of activity required for completion of the project. Any interference with traffic would be short-term during recording when shot holes were detonated or vibroseis buggies were operating. Once the project ended, or at least after one season of rain and snow, there would be little evidence that seismic exploration had occurred. Pronghorn hunting is widely dispersed and relatively few licenses are issued, so interference with that activity would be minimal. Boating during the fall on the White River is often precluded by low water levels. Seismic activity would not be visible from boaters on the river, and noise levels would likely be temporary if heard at all. Observations of impacts to the proposed project area from the previous seismic project covered in the Veritas EA reported that disturbance was minimal and would not encourage future ORV use of the area, except possibly in the area of Fantasy Canyon, where ORV use is already heavy (BLM 2003j). Overall, impacts to recreation would be short-term and low.



Figure 4.6 Bear Tracks (Photo Taken 4 p.m., October 1, 2003, on the Moon Ridge Seismic Project). Trail Had Been Brushed at 3 p.m. Same Day, and Drilling Was Completed at Noon of Same Day. Trail Led to Two Source Lines, and Drillers Had Worked in Area for 1 Week. Deer Track Occurred Near Bear Track, and Elk Track Occurred 0.25 mi East. Elk Had Been Rutting and Hid in Trees Near Drilling Activity During the Day. Wildlife Do Not Appear Bothered by Seismic Activity.

Issue 2. Impacts to Fantasy Canyon.

There would be some interference with traffic in the vicinity of Fantasy Canyon during recording, when people and vehicles would be excluded while shot holes were detonated or vibroseis buggies were operating. Signs would be posted to alert people to potential road closings (see Section 2.2.6.1). No source points would be located less than 660 ft from the Fantasy Canyon NSO area to ensure that peak particle velocities of 0.75 inches/second would not be exceeded, as specified in BLM Handbook H-3150, *Onshore Oil and Gas Geophysical Exploration Surface Management Requirements*. Peak particle velocities at 660 ft would likely be closer to 0.27 inches/second.

4.2.1.10 Lands Having Wilderness Characteristics

Issue 1. Impacts to wilderness characteristics.

A total of 916 acres of lands having wilderness characteristics occur within the proposed project area (see Figure 3.3). The proposed project would have only temporary impacts on these lands, much as it would on recreation in general (see Section 4.2.1.9).

No project-related roads would be constructed and no rights-of-way would be issued in these lands; therefore, the Proposed Action would not reduce the size of any lands with wilderness characteristics. In areas where heli-portable drilling would be used, naturalness would not be degraded. Helicopters would be used to transport workers, drills, and cables/geophones. Cables and geophones would be walked into the area--no vehicles other than ATVs would be used, except on existing routes. A recent BLM compliance audit (BLM 2001c) on a seismic project reported that in the area drilled using heli-portable techniques it was difficult to locate where work had been performed. Footprints by workers and small areas (<3' diameter) of subsurface cuttings where drilling occurred were all that was noticeable. This observation was made 1 week after seismic exploration had occurred.

In areas where buggy-mounted drills or vibroseis buggies would be used there would be shallow wheel ruts caused by the tires of the buggies, as well as broken brush and some small broken trees. Soils would be normal in appearance by the following year after rains, wind, and winter snows naturalize the soils, although any disturbed biological soil crusts could require 15 to 100+ years to completely recover (see Section 4.2.1.6). Broken vegetation would require an estimated two or three growing seasons before growth naturalizes the disturbed vegetation. This short-term disturbance of soils and vegetation would be limited to those portions of the area traversed by vehicles, and would be a temporary impact to the natural character of that portion of the area. Naturalness would be further affected if seismic routes used by truck- or buggy-mounted drills were subsequently used by ORVs and obvious damage to soils and vegetation were to occur.

Outstanding opportunities for solitude would be degraded during drilling and shooting/recording activities when there would be increased human activity as well by noise from helicopters. The use of helicopters to assist in transporting cables and geophones would result in some additional noise for the short-term while the helicopters would be in use. (For a more in-depth discussion of helicopter noise, please see the

Veritas EA at 4.7.1.1.) Solitude could be directly affected due to increased noise and human activity if seismic routes used by vibroseis buggies or buggy-mounted drills were subsequently used by ORVs.

Outstanding opportunities for primitive and unconfined recreation would be degraded by human activity in the immediate vicinity of the line and during the time that drilling and recording would occur. Helicopter noise would impact much of the area during the time helicopters would be operating. Primitive and unconfined recreation could be indirectly affected due to increase in motorized recreational activities if seismic routes used by truck- or buggy-mounted drills were subsequently used by ORVs.

Supplemental values would be temporarily affected by the Proposed Action because of short-term impacts to soils and vegetation and temporary displacement of some wildlife species. Supplemental wilderness values could be indirectly affected due to increased impacts to soils and vegetation, disturbance to wildlife, and increased human activity if seismic routes used by vibroseis buggies or buggy-mounted drills were subsequently used by ORVs.

Overall, implementation of the Proposed Action would result in impacts that would be low and temporary/short-term and would not degrade wilderness characteristics. Wilderness characteristics could be further affected if seismic routes used by vibroseis buggies or buggy-mounted drills were subsequently used by ORVs; however, observations of impacts to the proposed project area from the previous seismic project covered in the Veritas EA reported that disturbance was minimal and would not encourage future ORV use.

4.2.1.11 Mitigation Measures

Impacts to nesting birds would be completely mitigated if surveys were conducted to locate nests, and avoidance of such nests occurred. This would be necessary only if drilling/recording occurred during the nesting season.

4.2.1.12 Residual Impacts

Residual impacts would be short term and would consist primarily of crushed and broken vegetation that would generally recover in 1-3 years, and faint tire tracks that would be dissipated by rain, snow, and wind within one year.

4.2.1.13 Monitoring and/or Compliance

BLM would monitor activities on the proposed project as appropriate. BLM monitors had good cooperation from the proponents on seismic projects completed in the last few years. The proposed project area would be checked after the project ends, and Dawson would not be released from its responsibilities until the area meets BLM approval in a final compliance inspection.

4.2.2 Alternative B – No Action

The proposed project would not occur if Alternative B--the No Action Alternative--would be chosen. There would be no project-related impacts, and all current land uses and resource trends would continue. If the proposed project was not conducted, it is likely that more dry holes would be drilled in the future, resulting in unnecessary surface disturbance and additional costs for industry.

4.3 CUMULATIVE IMPACTS

4.3.1 Introduction

Cumulative impacts are defined by the *National Environmental Policy Act* (NEPA) as:

the impacts on the environment which result from the incremental impact of the action when added to other past, present, and reasonably foreseeable future actions regardless of what agency (Federal or non-Federal) or person undertakes such other actions. Cumulative impacts can result from individually minor but collectively significant actions taking place over a period of time.

The following sections assess the cumulative impacts of the alternatives in combination with past, present, and reasonably foreseeable action scenarios.

4.3.2 Present and Past Actions

As disclosed earlier in this EA, land use in the proposed project area is primarily oil and gas extraction, livestock grazing, wildlife habitat, and recreation. There are approximately 120 mi of roads and trails in the proposed project area, and 331 wells have been drilled (see Figure 3.1), 262 of which are producing at

this time. Many of these wells were drilled under an EA prepared for Enron's Chapita Wells Unit development (BLM 1998b). That EA determined that the development would have no significant impacts, and listed as residual impacts 310 acres of surface disturbance, short-term increases in fugitive dust emissions from construction, increased truck traffic, and reduced quality of the recreational experience near Fantasy Canyon from the addition of new wells. EOG Resources, Inc. proposed 161 additional infill wells in the Chapita Wells Unit in an EA, and a Finding of No Significant Impact was issued on April 11, 2000 (BLM 2000). Additional development of both oil and gas surrounds the proposed project area and includes the Red Wash Oil and Gas Field to the north, the Coyote Basin Oil Field to the east, the White River Oil and Gas Field and the Wonsits Valley Oil Field to the northwest, and the Expanded Monument Butte Field to the south and west. In addition, several gilsonite mines occur to the east of the proposed project area in the vicinity of Bonanza and Little Bonanza, as does the Bonanza Power Plant, a coal-burning plant. Numerous EAs have been completed for gilsonite mines (BLM 1994, 1997, 1999c, 2001d) and all have resulted in a Finding of No Significant Impact. No significant impacts to the human environment were identified in any of the NEPA documents cited above--whether direct, indirect, or cumulative.

4.3.3 Reasonably Foreseeable Action Scenarios (RFAS)

Approximately 100 wells approved in the Chapita Wells Unit remain to be drilled, and many of these wells will be drilled in the proposed project area. In addition, EOG Resources, Inc. has recently proposed drilling up to 627 new wells in the Chapita Wells/Stagecoach Area, which includes the proposed project area. This proposal is currently being evaluated in an EIS, and impacts from the proposed project have not yet been analyzed. Activity associated with existing wells will continue, as will livestock grazing and recreation associated with hunting and Fantasy Canyon.

4.3.4 Cumulative Impacts

To date, no significant impacts to resources within the proposed project area have been identified in NEPA documents prepared for development that has occurred in the area. The proposed project would not increase the severity of impacts to any resource so as to cause impacts to reach a significant level when added to past and present development and RFAS.

4.3.4.1 Cultural Resources

Issue 1. Direct impacts to cultural sites.

All cultural resources would be avoided by seismic-related activities; therefore, there would be no direct cumulative impacts to cultural resources as a result of the proposed project. However, impacts from unrestricted ORV use, oil and gas development, and grazing would continue at levels commensurate with future management decisions in the area.

4.3.4.2 Native American Religious Concerns

Issue 1. Impacts to Native American religious concerns.

No Native American religious concerns have been identified within the project area. The BLM is coordinating and consulting with tribes to determine if there are any concerns.

4.3.4.3 Threatened, Endangered, Proposed, and Candidate (TEPC) and Special Status (SS) Species

Issue 1. Impacts to TEPC and SS plants and their habitat.

The proposed project would not affect any TEPC or SS plants or their habitat; therefore, it would not add to cumulative impacts to these plants.

Issue 2. Impacts to TEPC and SS animals and their habitat.

Because of the temporary nature of the seismic exploration, the habitat affected, and the season when drilling and recording would occur (September-November), there would be no impacts to western yellow-billed cuckoo or Canada lynx; therefore, the proposed project would not add to cumulative impacts for those two species. The proposed project could affect foraging areas for bald eagle; however, cumulative impacts from the seismic project would be temporary and occur only from November to March if drilling and recording would occur during that period. Mexican spotted owls have never been documented in the proposed project area, and the 2000 habitat model does not indicate suitable nesting habitat in the area. However, the species could occasionally be present in the area and the proposed project could temporarily displace individual owls and disturb foraging during the approximately 3-month period when drilling and

recording would be accomplished. This would be in addition to any such disturbance caused by past and present activities and RFAS. The proposed project would not contribute to cumulative surface water depletions to the four Colorado River endangered fish species. Due to applicant-committed environmental protection measures and the temporary and seasonal nature of disturbance from the proposed project, there would be no impacts to black-footed ferrets in addition to those from past and present activities and RFAS, none of which have been determined to be significant.

The proposed project would not add to cumulative impacts for bluehead sucker, flannelmouth sucker, cornsnake, greater sage-grouse, mountain plover, Virginia warbler, black-throated gray warbler, gray vireo, Brewer's sparrow, sage sparrow, pinyon jay, prairie falcon, ferruginous hawk, burrowing owl, big free-tailed bat, or Townsend's big-eared bat because none of these species would be affected by more than temporary displacement during seismic activities.

4.3.4.4 Floodplains

Issue 1. Impacts to floodplain functions.

Because any project-related activity associated with the proposed project would be temporary, no cumulative impacts would occur. Future locations for oil and gas wells would also be required to avoid floodplains in accordance with guidance in the Book Cliffs RMP.

Issue 2. Impacts to banks of Coyote Wash.

Because any project-related activity associated with the proposed project would avoid steep slopes along Coyote Wash, and because areas with a lesser grade would be used for crossing, no cumulative impacts would occur. Future locations for oil and gas wells would also be required to avoid steep slopes/sensitive soils/floodplains in accordance with guidance in the Book Cliffs RMP.

4.3.4.5 Paleontological Resources

Issue 1. Disturbance/destruction of significant paleontological materials.

All known fossil sites and areas likely to have important fossils would be avoided; therefore, the proposed project would not contribute to cumulative impacts to paleontological resources. Appropriate mitigation--generally avoidance--has been required on past and present development, and would be included in projects included in RFAS.

4.3.4.6 Soils

Issue 1. Increased wind and water erosion.

Based on compliance reports conducted subsequent to four other seismic projects in the Book Cliffs, including one project that occurred in part in the proposed project area, impacts to soils would be negligible/minimal. Therefore, cumulative impacts to soils added to impacts from past and present activities and RFAS would be negligible. Future oil and gas development would also be required to use best management practices to control wind and water erosion to minimize such impacts.

Issue 2. Lack of reclamation success.

Little or no reclamation would be required for the proposed project; therefore, cumulative impacts would be negligible.

Issue 3. Impacts to biological soil crusts.

Those biological soil crusts that would be disturbed would add to the unquantified area of soil crusts disturbed by past and present activities and RFAS. The potential 4 acres of disturbance from the proposed project would be a negligible addition.

4.3.4.7 Vegetation

Issue 1. Direct impacts to native vegetation.

Some vegetation would be crushed, and some of the crushed vegetation would be killed. Compliance reports indicated that overall disturbance was negligible, would not be noticed by casual observers or passers-by, and would not encourage future ORV use and the additional impacts to vegetation that such use would cause. Therefore, cumulative impacts to vegetation would be negligible.

4.3.4.8 Wildlife Resources

Issue 1. Impacts to antelope, prairie dogs, raptors, and migratory birds.

The proposed project would contribute to cumulative impacts to temporary disturbance/displacement to pronghorn; however, such disturbance/displacement would be limited to the 3-month period during which drilling and recording would occur. As previously discussed, cumulative impacts to vegetation--wildlife habitat--would be negligible. The proposed project would not contribute to cumulative impacts to prairie dogs, and the timing of the project--late 2004--would preclude cumulative impacts to migratory birds. Disturbance to non-migratory birds would be temporary and would not have a measurable effect on individual species. Cumulative impacts would occur when combined with past and present activities and RFAS, but would be negligible.

4.3.4.9 Recreation

Issue 1. Reductions in recreation opportunity and experience.

The proposed project would add to cumulative impacts to recreation, but only during the short time that drilling and recording would occur. Impacts would include increased traffic and noise, interference with pronghorn hunters, and visual impacts during an approximately 3-month period in late 2004.

Issue 2. Impacts to Fantasy Canyon.

The proposed project would add to cumulative impacts--interference with traffic and increased noise--in the vicinity of Fantasy Canyon, but only during the short time that drilling and recording would occur.

4.3.4.10 Lands Having Wilderness Characteristics***Issue 1. Impacts to wilderness characteristics.***

The proposed project would add to cumulative impacts to lands having or likely to have wilderness characteristics during the short time that drilling and recording would occur. Some disturbance to vegetation could be visible for 3-5 years. Impacts from unrestricted ORV use, oil and gas development, and grazing would continue at levels commensurate with future management decisions in the area.
